Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (currently amended) A bubble cap for use in a reactor in which a gaseous fluid having a vapor density and a liquid fluid having a liquid density flow concurrently downwards in the reactor, the bubble cap comprising:

a cap with at least one slot and a riser, configured with a skirt height of at least 4 cm such that 1.5 * Skirt Height (cm) + [Slot Length (cm) – Exposed Slot Height (cm)] ≥ 7.5, wherein the Exposed Slot Height is determined to equal $44.2 * X^{0.52}$;

wherein X is $Q_v * (W_s * N_s)^{-1} * [\rho_v / (\rho_l - \rho_v)]^{0.5}$, wherein Q_v is a vapor volumetric rate flowing through the cap, W_s is mean slot width (cm), N_s is number of slots, ρ_v is the vapor density (kg/m^3), and ρ_l is the liquid density (kg/m^3) and;

wherein the bubble cap is disposed such that [a] the liquid fluid and [a] the gaseous fluid flow co-currently upwardly in a space between the riser and the cap.

2. (Original) The bubble cap of claim 1, wherein 1.5 * Skirt Height (cm) + [Slot Length (cm) – Exposed Slot Height (cm)] ≥ 15.

3. (Original) The bubble cap of claim 1, wherein 1.5 * Skirt Height (cm) + [Slot Length (cm) – Exposed Slot Height (cm)] ≥ 22.5.

4. (Original) The bubble cap of claim 1, wherein 1.5 * Skirt Height (cm) + [Slot Length (cm) – Exposed Slot Height (cm)] ≥ 30.

5. (currently amended) A bubble cap for use in a reactor in which a gaseous fluid having a vapor density and a liquid fluid having a liquid density flow concurrently downwards in the reactor, the bubble cap comprising:

a cap with at least three slots and a riser, configured with a skirt height of at least 4 cm such that 1.5 * Skirt Height (cm) + [Slot Length (cm) – Exposed Slot Height (cm)] ≥ 7.5, wherein the Exposed Slot Height is determined to equal $44.2 * X^{0.52}$,

wherein X is $Q_v * (W_s * N_s)^{-1} * [\rho_v / (\rho_l - \rho_v)]^{0.5}$, wherein Q_v is a vapor volumetric rate flowing through the cap, W_s is mean slot width (cm), N_s is number of slots, ρ_v is the vapor density (kg/m^3), and ρ_l is the liquid density (kg/m^3); and

wherein the bubble cap is disposed such that [a] the liquid fluid and [a] the gaseous fluid flow co-currently upwardly in a space between the riser and the cap.

6. (Original) The bubble cap of claim 5, wherein 1.5 * Skirt Height (cm) + [Slot Length (cm) – Exposed Slot Height (cm)] ≥ 15.

7. (Original) The bubble cap of claim 5, wherein 1.5 * Skirt Height (cm) + [Slot Length (cm) – Exposed Slot Height (cm)] ≥ 22.5.

8. (Original) The bubble cap of Claim 5, wherein 1.5 * Skirt Height (cm) + [Slot Length (cm) – Exposed Slot Height (cm)] ≥ 30.

9. (currently amended) A bubble cap for use in a reactor in which a gaseous fluid having a vapor density and a liquid fluid having a liquid density flow concurrently downwards in the reactor, the bubble cap comprising:

a cap with at least five slots and a riser, configured with a skirt height of at least 4 cm such that 1.5 * Skirt Height (cm) + [Slot Length (cm) – Exposed Slot Height (cm)] ≥ 7.5, wherein the Exposed Slot Height is determined to equal $44.2 * X^{0.52}$;

wherein X is $Q_v * (W_s * N_s)^{-1} * [\rho_v / (\rho_l - \rho_v)]^{0.5}$, wherein Q_v is a vapor volumetric rate flowing through the cap, W_s is mean slot width (cm), N_s is number of slots, ρ_v is the vapor density (kg/m^3), and ρ_l is the liquid density (kg/m^3) and;

wherein the bubble cap is disposed such that [a] the liquid fluid and [a] the gaseous fluid flow co-currently upwardly in a space between the riser and the cap.

10. (Original) The bubble cap of claim 9, wherein 1.5 * Skirt Height (cm) + [Slot Length (cm) – Exposed Slot Height (cm)] ≥ 15.

11. (Original) The bubble cap of claim 9, wherein 1.5 * Skirt Height (cm) + [Slot Length (cm) -- Exposed Slot Height (cm)] $\geq$ 22.5.

12. (Original) The bubble cap of claim 9, wherein 1.5 * Skirt Height (cm) + [Slot Length (cm) – Exposed Slot Height (cm)] $\geq$30

13. (currently amended) A bubble cap for use in a reactor in which a gaseous fluid having a vapor density and a liquid fluid having a liquid density flow concurrently downwards in the reactor, the bubble cap comprising:

a cap with at least seven slots and a riser, configured with a skirt height of at least 4 cm such that 1.5 * Skirt Height (cm) + [Slot Length (cm) – Exposed Slot Height (cm)] $\geq$ 7.5, wherein the Exposed Slot Height is determined to equal 44.2 * $X^{0.52}$;

wherein X is $Q_v * (W_s * N_s)^{-1} * [\rho_v / (\rho_l - \rho_v)]^{0.5}$, wherein Q_v is a vapor volumetric rate flowing through the cap, W_s is mean slot width (cm), N_s is number of slots, ρ_v is the vapor density (kg/m^3), and ρ_l is the liquid density (kg/m^3) and;

wherein the bubble cap is disposed such that [a] the liquid fluid and [a] the gaseous fluid flow co-currently upwardly in a space between the riser and the cap.

14. (Original) The bubble cap of claim 13, wherein 1.5 * Skirt Height (cm) + [Slot Length (cm) – Exposed Slot Height (cm)] $\geq$ 15.

15. (Original) The bubble cap of Claim 13, wherein 1.5 * Skirt Height (cm) + [Slot Length (cm) – Exposed Slot Height (cm)] $\geq$ 22.5.

16. (Original) The bubble cap of Claim 13, wherein 1.5 * Skirt Height (cm) + [Slot Length (cm) – Exposed Slot Height (cm)] $\geq$ 30.